

REMARKS

Claims 1-9 were pending in the application, with claims 10-15 withdrawn. Claims 1 and 3-9 were rejected under 35 U.S.C. §103(a) as being unpatentable over JP2001-248794 to Murai ("Murai"). Claims 2 and 3 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Murai in view of JP2000-064073 to Wada *et al.* ("Wada"). With entry of this amendment, claims 1 and 9 are amended, claims 4-8 are canceled. Reexamination and reconsideration are respectfully requested.

Rejection of Claims 1 and 3-9 in view of Murai

Independent claim 1 was rejected as being unpatentable over Murai. Claim 1 recites an ozone processing apparatus that processes a process object by using ozone gas. The apparatus includes: a processing part having a processing space configured to contain a process object therein; an ozone generator configured to generate ozone gas from an oxygen-containing gas through an electric discharge; an ozone supply line provided to supply the ozone gas generated by the ozone generator into the processing space of the processing part; a steam generator configured to generate water vapor; a steam supply line connected to the ozone supply line to supply the water vapor generated by the steam generator into the ozone supply line; and a metal trap arranged in the ozone supply line at a portion thereof downstream of a joint between the ozone supply line and the steam supply line, the metal trap containing an adsorbent composed of a silicon-containing material.

Claim 1 is amended to specify that the metal trap is arranged in a way such that a mixed fluid containing the ozone gas and the water vapor is introduced into the metal trap. Claim 1 is further amended to incorporate the limitations of the original claim 4, specifying that the apparatus further includes a cooler arranged in the ozone supply line at a portion thereof downstream of the metal trap to cool the mixed fluid containing the ozone gas and the water vapor having been passed through the metal trap; and a gas-liquid separator arranged in the ozone supply line at a portion thereof downstream of the cooler to separate the ozone gas contained in the mixed fluid cooled by the cooler from condensed water generated by cooling the water vapor.

Fig. 7 illustrates a non-limiting example of the embodiment claimed in claim 1. It is important to note that the claim specifies a particular arrangement of at least some of the components of the claimed ozone processing apparatus. In particular, amended claim 1 clearly indicates that (i) the joint to between the ozone supply line and the steam supply line, (ii) the metal trap, (iii) the cooler, and (iv) the gas-liquid separator are arranged in that order in the ozone supply line from upstream to downstream. Accordingly, the mixing of the ozone gas and the water vapor takes place before the mixed fluid can be passed through the metal trap to remove a metal. Then, the mixed fluid is cooled by the cooler. Finally, the ozone gas and the condensed water from the cooled fluid are separated by the gas-liquid separator.

This particular arrangement of the various components, as recited in amended claim 1, is not disclosed by Murai for the reasons provided below. Although Applicants' arguments below refer to sections of the machine-translated version of Murai, which was cited by the Examiner in the Office Action, Murai can be found in its U.S. counterpart, U.S. Patent No. 6,530,976 ("U.S. '976"), which was submitted in an IDS dated June 29, 2009.

The Examiner cites paragraph [0024] of Murai for a number of elements (*e.g.*, metal trap, gas-liquid separator) of claim 1 without clearly identifying particular sections of Murai's apparatus that correspond to those elements. It is respectfully requested that the Examiner refer to specific components of Murai's apparatus in future Office Actions so that Applicants can better address the Examiner's rejections.

Paragraph [0024] of Murai states that "a filter can be allocated in the *lower stream side* of the condensator 22 [to remove metal vapor and particles] which are produced by electric discharge [in the] ozone generator, and [as a result] the endurance of the storage device 29 can be improved." (Emphasis added, see also U.S. '976, col. 5, lines 25-28.) The same paragraph also states that "it is possible to supply [sic] moisture to the *upper stream side* of the condensator 22 in a form of steam *etc.*, and [the particles and moisture can be removed] by cooling." (Emphasis added, see also U.S. '976, col. 5, lines 36-38.) It is clear from the above-cited sections that Murai discloses an arrangement where a joint to the steam supply line is upstream to the condensator, which is upstream to the filter. This arrangement, namely having the filter downstream to the condensator, is

not the same as the arrangement recited in claim 1, which requires the metal trap to be upstream to the cooler.

It is further submitted that this order in which the components are set is not arbitrary. In the claimed embodiment, metal components (*e.g.*, Cr), which are produced by electric discharge and contained in ozone gas, can be effectively removed *first* by a metal trap employing a silicon-containing absorbent if the ozone gas is supplied to the metal trap with water vapor. (See, *e.g.*, paragraph [0050] of the published application.) Contaminants (*e.g.*, metal components and other impurities) not removed by the metal trap can *then* be removed by dissolving them in condensed water using the cooler and separating the condensed water from the gas. (See, *e.g.*, paragraphs [0030] of the published application.) Thus, the apparatus of claim 1 performs a two-step process to remove contaminants in the ozone gas.

In contrast, the only component in Murai that removes metal steam and particles is the filter. By positioning the filter downstream to the condensator, Murai at most discloses a single filtering step performed by the filter. The condensator of Murai is used for controlling a temperature change of the storage device. (See paragraph [0024] of Murai. A portion of U.S. '976 states that "[t]he reason for cooling the gas with the cooling device 22 are so that the efficiency of ozone absorption in the storage device 29 is increased and fluctuations in temperature in the storage device 29 are reduced. (Col. 5, lns. 6-8.)) The storage device 29 is for storing ozone. (See paragraph [0035] of Murai.) Murai does not disclose that the storage device 29 performs any filtering. Thus, Murai at least does not disclose *both* using a metal trap to remove a metal and cooling the gas to dissolve contaminants in the condensed water and separating the condensed water from the gas to remove the contaminants. By using both the metal trap and the gas-liquid separator to remove contaminants, the claimed embodiment of the present invention is more effective than the method disclosed in Murai.

The Examiner acknowledges that Murai does not disclose a trap that is metal. (Office Action, at 3, § 6.) Nevertheless, the Examiner states that "it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the trap be made of metal." (*Id.*) Applicants respectfully submit that Murai fails to disclose not only a trap that is metal, but one "containing an adsorbent composed of a silicon-containing material." The only component in

Murai that includes “silica gel” as an absorbent is the storage container 26 (see paragraph [0035]). However, the silica gel in the storage container is for absorbing ozone, not contaminants. (*Id.*) In addition, as discussed above, the storage container 26 cannot be the metal trap because (i) it is downstream to the condensator, and (ii) no “mixed fluid containing the ozone gas and the water vapor” is introduced into the storage container 26 as required by the claim.

The filter also cannot be considered the same as the metal trap of claim 1 because Murai does not specify that the filter is metal or contains an adsorbent composed of a silicon-containing material and also because the filter is downstream to the condensator. Furthermore, Applicants respectfully submit that it would not have been obvious for one skilled in the art at the time of the invention to use a metal trap containing an adsorbent composed of a silicon-containing material as the filter because there is no suggestion in Murai to use such a filter. Even assuming, *arguendo*, that somehow it would have been obvious to use such a metal trap in view of Murai, Murai still fails to disclose an apparatus having the same components arranged in the particular way as discussed above. For at the reasons provided above, Applicants submit that Murai does not anticipate or render obvious amended claim 1.

With regard to claim 3, because claim 3 depends from claim 1, claim 3 should also be patentable over Murai for the reasons discussed above. In addition, Applicants traverse the rejection on the ground that the recitation of claim 3 is not an obvious design choice. Claim 3 recites that “the metal trap comprises a container containing plural chips composed of the silicon-containing material.” The Examiner acknowledges that Murai does not disclose that “the silicon-containing material is in the form of chips.” However, the Examiner states that it would have been an obvious of design choice to use chips, since applicant has not disclosed that this form of silicon-containing material solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with a gel.” Again, it seems that the Examiner is referring to the storage container 26 (which contains silica gel as adsorbent) as the trap. For reasons discussed above, Applicants respectfully submit that the storage container cannot be the same as the metal trap. In addition, paragraph [0049] of the published application explicitly states:

In order to *enlarge a total surface area of the silicon-containing adsorbent 100a* in the container 100b to improve adsorption efficiency, the silicon-containing adsorbent

100a is preferably provided in a form of plural small chips. In the most preferred embodiment, a number of small chips formed by crushing a high-purity silicon wafer are contained in the container 100b as the silicon-containing adsorbent 100a.

(Emphasis added.) It is clear from the above-cited section that there is an advantage of using silicon-containing material in the form of chips (rather than gel, for example). Thus, the chips are not an obvious design choice.

Claim 9 is amended to be dependent from claim 1 and thus it should be patentable over Murai for the reasons provided above with regard to claim 9. The rejection of claim 9 is further traversed on the ground that there is no suggestion in Murai to include a tank holding water. Murai only discloses using a filter to remove particles without providing any details of the filter. Applicants request that the Examiner provide documentary evidence to support the assertion that it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a water tank, in Murai's apparatus, to separate the condensed water from the gas.

Claims 4-8 are hereby canceled, rendering the rejection of these claims moot.

Rejection of Claims 2 and 3 in View of Murai and Wada

Because both claims 2 and 3 depend from claim 1 and Wada does not cure the deficiencies of Murai, the rejection of claims 2 and 3 should be withdrawn.

If, for any reason, the Examiner finds the application other than in condition for allowance, Applicant requests that the Examiner contact the undersigned attorney at the Los Angeles telephone number (213) 892-5459 to discuss any steps necessary to place the application in condition for allowance.

In the unlikely event that the transmittal form is separated from this document and the Patent Office determines that an extension and/or other relief is required, Applicants petition for any required relief including extensions of time and authorize the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit

Account No. 03-1952 referencing 199372005700. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

Dated: February 22, 2010

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